



(1)

Optimal Bit and Power Loading for Amplify-and-Forward Cooperative OFDM System

O. Amin, and M. Uysal

Abstract:

In this paper, we investigate bit and power allocation strategies for an orthogonal frequency division multiplexing (OFDM) cooperative network over frequency-selective fading channels. We assume amplify-and-forward relaying and consider the bit error rate (BER) performance as our performance measure. Aiming to optimize the BER under total power constraint and for a given average data rate, we propose three adaptive algorithms; optimal power loading (OPL), optimal bit loading (OBL), and optimal joint bit and power loading (OBPL). Our Monte Carlo simulation results demonstrate performance gains through adaptive bit and power loading over conventional non-adaptive systems as well as currently available adaptive cooperative scheme in the literature. The impact of practical issues on the performance of proposed adaptive schemes such as imperfect channel estimation and limited feedback is further discussed.

Keywords:

OFDM , amplify-and-forward relaying , bit allocation , cooperative network , power allocation

Published In:

Egypt □ Assiut , vol. 10, no.3 , pp. 772-781



(2)

Adaptive Power Loading for Multi-Relay OFDM Regenerative Networks with Relay Selection

Amin, and M. Uysal

Abstract:

In this paper, we propose an adaptive power loading algorithm for an OFDM (orthogonal frequency division multiplexing)-based multi-relay regenerative network with relay selection. The proposed scheme is based on selecting the "best" relay(s) according to different strategies and distributing the power adaptively among the subcarriers of source and selected relay(s) as to minimize an upper bound on the bit error rate (BER). Our Monte Carlo simulation results demonstrate superior performance gains through power loading with respect to conventional equal power loading schemes. The effects of imperfect channel estimation and relay location on the BER performance are further discussed.

Keywords:

OFDM , cooperative diversity , detect-and-forward relaying , power allocation , relay selection

Published In:

Egypt □ Assiut , vol. 60, no. 3 , pp. 614 - 619



(3)

Adaptive Bit Loading for Multi-Relay Cooperative OFDM with Imperfect Channel Estimation

O. Amin, S. S. Ikki and M. Uysal

Abstract:

In this study, the authors introduce an adaptive bit loading scheme for an amplify-and-forward orthogonal frequency division multiple cooperative system with relay selection. The proposed bit loading scheme maximises the throughput for a target error rate taking into account the quality of imperfect channel estimation. It relies on estimated channel state information (CSI) at the destination node and partial CSI (which involves the number of loaded bits) at the source node. The authors provide extensive Monte Carlo simulation results to demonstrate the throughput and the no-transmission probability performance of the proposed scheme and discuss the effect of various system and channel parameters on the performance.

Keywords:

Monte Carlo methods; channel estimation; amplify and forward communication; OFDM modulation; cooperative communication

Published In:

Egypt □ Assiut , ,



(4)

Energy Consumption and Lifetime Analysis for Wireless Sensor Networks

Mohammed Abo-Zahhad, Mohammed Farrag, Abdelhay Ali and Osama Amin

Abstract:

Energy consumption and energy modeling are important issues in designing and implementing of Wireless Sensor Networks (WSNs), which help the designers to optimize the energy consumption in WSN nodes. Good knowledge of the sources of energy consumption in WSNs is the first step to reduce energy consumption. Therefore, an accurate energy model is required for the evaluation of communication protocols. In this paper, we present an energy analysis technique for WSNs considering the physical layer parameters by determining the energy consumed per payload bit transferred without error over AWGN channel. We show how the transmission power must be chosen in order to achieve energy-efficient communications over AWGN channel and provide a closed-form expression for optimum transmission power. We also find that, for each modulation scheme, there are optimal transmission power at which the energy consumption is minimized. The proposed model can be used to analyse the WSNs energy consumption, to evaluate communication protocols, and it can also use to estimate energy consumption and network lifetime which used for on-line energy accounting.

Keywords:

Wireless Sensor Network, Optimal Transmit Power, Minimum Energy Consumption, Energy Consumption Model, Lifetime, Physical layer.

Published In:

IEEE 32nd National Radio Science Conference (NRSC), IEEE. , NULL , NULL



(5)

An Energy Consumption Model for Wireless Sensor Networks

Mohammed Abo-Zahhad, Mohammed Farrag, Abdelhay Ali and Osama Amin

Abstract:

Energy consumption and energy modeling are important issues in designing and implementing of Wireless Sensor Networks (WSNs), which help the designers to optimize the energy consumption in WSN nodes. Good knowledge of the sources of energy consumption in WSNs is the first step to reduce energy consumption. Therefore, an accurate energy model is required for the evaluation of communication protocols. In this paper, we provide an energy model for WSNs considering the physical layer and MAC layer parameters by determining the energy consumed per payload bit transferred without error over AWGN channel. We show how the transmission power must be chosen in order to achieve energy-efficient communications over AWGN channel. We also find that, for each modulation scheme, there are optimal transmission power at which the energy consumption is minimized. Moreover, we investigated the energy saving gained from optimizing the constellation size.

Keywords:

Wireless Sensor Network, Energy Consumption Model, Optimal Transmit Power, Minimum Energy Consumption.

Published In:

IEEE 5th Annual International Conference on Energy Aware Computing Systems and Applications (ICEAC 2015), IEEE. ,
NULL , NULL



(6)

A Survey on Protocols, Platforms and Simulation Tools for Wireless Sensor Networks

Mohammed Abo-Zahhad*, Osama Amin, Mohammed Farrag and Abdelhay Ali

Abstract:

Wireless Sensor Networks (WSNs) are becoming very common technology which combine sensing, processing, and wireless multi-hop networking. This paper provides a wide review of the present state about WSNs at the time of its writing. Following a top-down approach, WSNs concept, definition and applications is provided. Furthermore, an overview of WSNs constrains and judgment metrics such as lifetime and latency is given. Then, the communication protocol stack for WSNs is described, and protocols developed for each layer are discussed. Finally, this paper provides review and comparisons of current simulation programs All of these features make the paper valuable for an extensive variety of possible readers, researchers in WSNs, students stating research in WSNs, specialists wanting to offer WSN solutions, and WSN application designers.

Keywords:

Wireless sensor networks; communication protocol stack; Platforms; Simulator Tools; Ad hoc networks

Published In:

International Journal of Energy, Information and Communications , ,



(7)

Survey on Energy Consumption Models in Wireless Sensor Networks

Mohammed Abo-Zahhad, Osama Amin, Mohammed Farrag, Abdelhay Ali

Abstract:

Wireless Sensor Network (WSN) is one of the most important areas of research in the twenty- first century. WSN aims to sense a certain natural phenomenon and sends sensed data to sink using a multi - hop network. In order to increase the lifetime of the battery-based sensing nodes, it is essential to minimize the consumed energy in the sensing process. The first step to achieve this goal is to know completely the sources of energy consumption in WSNs. In this paper, sources of energy consumption at various communication layers have been studied and investigated. Furthermore, survey has been provided for existing energy models and the classification of these models into physical layer, MAC layer and cross-layer energy models. Finally, a comparison between existing available energy models has been provided.

Keywords:

Energy Consumption Models; Wireless Sensor Networks; ad hoc Networks; Networking Layer; Data Link Layer; Medium Access Control; Physical Layer; Cross-layer

Published In:

Open Transactions on Wireless Sensor Network , ,



(8)

Energy efficiency-spectral efficiency tradeoff: A multiobjective optimization approach

Amin, Osama; Bedeer, Ebrahim; Ahmed, Mohamed Hossam; Dobre, Octavia A.

Abstract:

NULL

Keywords:

NULL

Published In:

Institute of Electrical and Electronics Engineers Inc. , v 65, n 4 , p 1975-1981



(9)

Performance Analysis of Multiple-Relay Cooperative Systems with Signal Space Diversity

Amin, Osama; Mesleh, Raed; Ikki, Salama S.; Ahmed, Mohamed Hossam; Dobre, Octavia A.

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE Transactions on Vehicular Technology , v 64, n 8 , p 3414-3425



(10)

Energy-Efficient Power Loading for OFDM-Based Cognitive Radio Systems with Channel Uncertainties

Bedeer, Ebrahim; Amin, Osama; Dobre, Octavia A.; Ahmed, Mohamed H.; Baddour, Kareem E.

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE Transactions on Vehicular Technology , v 64, n 6 , p 2672-2677